



## Drying fruits

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### Quick Facts...

- Successful drying depends on heat, air dryness and good air circulation.
- Select fresh, fully-ripened fruits.
- Pretreat light-colored fruit by dipping in an ascorbic acid or sulfite solution, steam-blanching, or sulphuring outdoors.
- When dry, allow fruit to "condition" for four to 10 days before packaging for storage.
- Package dried fruits in tightly sealed containers and store in a cool, dry place.

Drying is a creative way to preserve foods and use home-grown fruit, ~~extra~~ produce (e.g., ripe bananas) and roadside market specials. Like all methods of preservation, drying causes some nutrient loss. See fact sheet 9.308, *Drying vegetables*, for specific information on nutrient loss.

### Drying Trays

Selection or construction of trays for drying may be simple or complex. Good air circulation without reaction between food and tray is most important. See 9.308, *Drying vegetables*, for specific information on the selection and construction of trays.

### Selecting and Pretreating Fruits

See Table 1 for approximate yields of dried fruits.

Select fresh and fully-ripened fruits. Immature produce will lack flavor and color. Over-mature produce can be tough and fibrous or soft and mushy. Drying does not improve the quality of foods.

Thoroughly wash and clean fruits to remove dirt or spray. Sort and discard any fruit that shows decay, bruises or mold. Such defects can affect all foods being dried.

Fruits can be dried safely without any pretreatment, but pretreating helps keep light-colored fruits from darkening during drying and storage. It also speeds the drying of fruits with tough skins, such as grapes and cherries. Several methods can be used. See Table 2 for specific recommendations for each fruit.

**Ascorbic acid** (vitamin C) is an antioxidant that keeps fruit from darkening. Pure crystals usually are available at drug stores. Prepare a solution of 1 to 2-1/2 teaspoons of pure ascorbic acid crystals to 1 cup cold water. Vitamin C tablets can be crushed and used (six 500 milligram tablets equal 1 teaspoon ascorbic acid). One cup treats about 1/2 quarts of cut fruit. Dip peeled and cut fruit directly in ascorbic acid solution. Soak for a few minutes, remove with a slotted spoon, drain well and dehydrate.

Commercial antioxidant mixtures are not as effective as ascorbic acid but are more readily available in grocery stores. Follow directions on the container for "fresh cut fruit."

*Steam blanching* is suggested for some fruits to reduce discoloration and nutrient loss during drying. It also softens fruits so they dry faster.

<b>Table 1: Yield of dried fruits.</b>				
<b>Produce</b>	<b>Amount purchased or picked</b>		<b>Amount dried product</b>	
	<b>Pounds</b>		<b>Pounds</b>	<b>Pints</b>
Apples	12		1-1/4	3
Grapes	12		2	3
Peaches	12		1 to 1-1/2	2 to 3
Pears	14		1-1/2	3
Tomatoes	14		1/2	2-1/2 to 3

### **To steam blanch fruits**

Put at least 2 inches of water in a large kettle or pan. Fit some type of rack (wire, wood, tin cans opened on both ends, etc.) into kettle to keep fruit above water. Heat water to boiling.

Place prepared fruit in wire basket, open mesh or cheesecloth bag on rack. Fill no more than 2 to 2-1/2 inches deep. Place filled basket or bag on rack; cover kettle and let fruit steam for half the suggested time.

Check to see that each piece is reached by steam. Stir or shake fruit if necessary. Replace cover and continue to blanch for minimum time. Test a piece from the center of the basket. It will be wilted and feel heated through when it is adequately blanched.

Spread blanched fruit on clean cloth or paper towel to remove extra moisture.

*Sulfur and sulfite* compounds have been used for centuries to prevent discoloration and reduce spoilage during the preparation, dehydration, storage and distribution of many foods.

However, in recent years, sulfites have been implicated as initiators of asthmatic reactions in some people, especially those with asthma. As a result, the Food and Drug Administration (FDA) has banned the use of sulfites on fresh fruits and vegetables intended to be sold or served raw to consumers. Sulfuring exposes fruits to sulfur dioxide by burning flowers of sulfur in a closed container. Sulfiting refers to soaking fruit for a certain time in a solution of sodium bisulfite and water. This releases sulfur dioxide and has the same general effect as sulfuring. Treating with sulfur dioxide helps keep insects off during sun drying, decreases loss of vitamins A and C (though thiamin loss is increased), and preserves the color and flavor of fruits during drying and storage.

### **To sulfur fruits**

Prepare sulfuring box. Use a heavy cardboard or wooden box with no cracks or openings. Box must be large enough to place over sulfur container and stack of trays with 6 inches to spare between outside edges of trays and inside of the box. Cut a small flap (6 inches by 2 inches) at bottom front of

box and a small slash or hole at upper edge of opposite side of box (see Figure 1).

Place box outdoors on cement or ground (not grass) and away from close contact with plants, shrubs and trees. Spread fruit in single layer on wooden trays, pit cavity side or cut surfaces up. Pieces should not touch each other.

Position four bricks under the box (one at each corner) to raise stack of trays 6 to 8 inches off ground. Stack trays on top of fire bricks. Space 1-1/2 inches apart, separated by wooden blocks, spools or other spacers placed at corners.

Measure sulfur and place in clean, shallow metal container. Use U.S.P. standard elemental sulfur, also called sulfur flowers or flowers of sulfur (available at most pharmacies). The amount used will vary with the length of time the fruit is to be sulfured, weight of the fruit, and dimensions of box. Generally, if using a cardboard box to cover trays, use 1 to 2 teaspoons of sulfur per pound of fruit (weight before drying). If using an air-tight sulfuring box constructed from wood, use only 1 teaspoon of sulfur per pound of fruit. Spread sulfur in a smooth layer not more than 1/2 inch deep. Keep free of bits of paper or matches as these hinder burning.

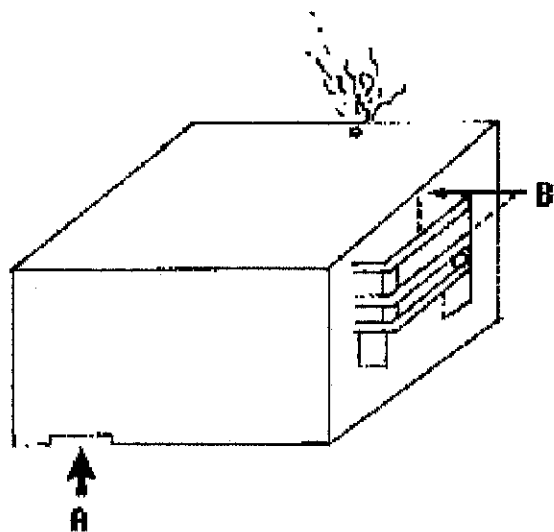


Figure 1: A homemade sulfuring box. A. A notch in the bottom of the box, 6 inches wide by 2 inches high, lets in air for sulfur to burn. Close when burning is done. B. Top of box 6 inches above top tray. Equal amount of space on all sides so fumes can spread.

Place pan of sulfur on ground in front of trays and light. Sulfur first melts at around 240 degrees F, and becomes a brown pastry-looking substance. Then it catches on fire and burns with a clear blue flame. The odor, sulfur dioxide gas, is what protects the fruit.

Lower box over stack of trays, leaving flap open so sulfur can burn well. When sulfur is burning well (a few minutes), close opening in box and seal bottom edges with dirt. Leave fruit in sulfur fumes the length of time indicated in Table 2. When fruit is sulfured it will appear bright and glistening and feel smooth, not tacky.

When sulfuring is complete, remove box by tilting it toward you so fumes escape away from your face. Place fruits to dry. The same trays used for sulfuring may be used for drying.

*Sulfiting* is suggested as a substitute for sulfuring outdoors. Although it is not quite as effective as sulfuring, it's easier to do, and sulfited products are of higher quality than untreated ones. Purchase U.S.P. (food grade) or Reagent Grade sodium sulfite, sodium bisulfite or sodium metabisulfite at pharmacies or where wine-making supplies are sold. Do not use bisulfate or products of Practical Grade.

Prepare a solution using one of the following formulas:

**Sodium bisulfite:** 1 tablespoon per gallon water (3/4 teaspoon per quart).

**Sodium sulfite:** 2 tablespoons per gallon water (1-1/2 teaspoon/quart).

**Sodium metabisulfite:** 4 tablespoons per gallon water (2 tablespoon/quart).

Soak fruit five to 15 minutes, depending on size. Drain; rinse lightly under tap water; spread on clean cloth or paper towels to remove excess moisture and proceed with drying.

**Warning:** Do not use the household oven to dry sulfited fruits. The sulfur fumes that form have an unpleasant odor and can be harmful to health. Dry sulfited fruits outdoors or in equipment that is vented outdoors. Keep children, animals and household plants away from sulfuring procedures during the first hour of drying.

**Cracking Skins:** Fruits such as grapes, prunes, small dark plums, cherries, figs and firm berries have tough skins with a wax-like coating. To allow inside moisture to evaporate, crack or "check" skins before drying whole fruits.

To crack skins, dip fruit in briskly boiling water for 30 to 60 seconds, then dip in very cold water. Drain on absorbent towel before placing on drying trays.

## Drying Methods

Arrange pretreated fruits on drying trays in single layers, pit cavity up. Dry in sun, oven, room or dehydrator as described in 9.308, Drying vegetables.

Fruits dry in the sun in from 12 hours to four or five days, and in the oven from six to 24 hours. Stir food and turn large pieces over about halfway through drying period.

Fruits scorch easily toward the end of drying. If sun drying, bring fruits in from the sun when they seem about two-thirds dry. When drying in an oven or dehydrator, turn the power off when drying is almost complete and open the door wide for an additional hour.

## Testing for Dryness

Foods should be dry enough to prevent microbial growth and subsequent spoilage. Dried fruits should be leathery and pliable. See Table 2 for dryness test on individual fruits.

To test foods for dryness, remove a few pieces and let cool to room temperature. When warm or hot, fruits seem more soft, moist and pliable than they actually are. Squeeze a handful of the fruit. If no moisture is left on the hand and pieces spring apart when released, they are dry.

## Post-Drying Treatment

**Conditioning:** When drying is complete, some pieces will be more moist than others due to their size and placement during drying. Conditioning is a process used to evenly distribute the minimal residual moisture evenly throughout all pieces. This reduces the chance of spoilage, especially from mold.

To condition, place cooled dried fruit loosely in large plastic or glass containers, about two-thirds

full. Cover and store in a warm, dry, well ventilated place for four to 10 days. Stir or shake containers daily to separate pieces. If beads of moisture form inside, return food to drying trays for further drying, then repeat conditioning process.

**Pasteurizing:** Foods exposed to insects (including fruit flies and Indian meal moths) before or during the drying process should be pasteurized to destroy insect eggs. Pasteurizing also helps remove excess moisture that may have been reabsorbed during conditioning.

**Freezer method.** Seal dried food in heavy freezer containers (boxes or bags). Freeze for 48 hours to kill insects and insect eggs. Remove and package promptly for permanent storage. Do not allow sweating to take place inside bags.

**Oven method.** Reheat dried foods on trays at 150 degrees F for 30 minutes or 175 degrees F for 15 minutes. Remove, cool quickly and package for permanent storage. This method of pasteurizing results in additional loss of vitamins, and, if not done carefully, may scorch food.

## Packaging and Storage

Pack cooled, dried foods in small amounts of dry, scalded glass jars (preferably dark) or in moisture and vapor-proof freezer containers, boxes or bags and store in a cool, dry, dark place. See 9.308, Drying vegetables, for complete instructions on packaging and storage. Properly stored, dried fruits keep well for six to 12 months.

## Using Dried Fruits

To cook dried fruit, cover with boiling water and simmer covered, until tender (about 15 minutes). If needed, sweeten to taste near the end of cooking or after removing from heat. Most dried fruits need no extra sweetening. If desired, add a few grains of salt to help bring out the fruit's natural sweetness, or add a little lemon, orange or grapefruit juice just before serving. This helps give fruits a fresh flavor and adds vitamin C.

If fruit is to be reconstituted for use in a cooked dish, such as a pie, place fruit in a bowl and cover with boiling water. Let soak until tender and liquid is absorbed (one hour or longer). Thinly sliced fruits may not require soaking before using in cooked dishes.

Reconstituted or dried fruits are excellent used in cobblers, breads, pies, puddings, gelatin salads, milk shakes and cooked cereals. Any liquid that remains after soaking can be used as part of the water needed in the recipe.

<b>Fruit</b>	<b>Preparation</b>	<b>Pretreatment</b>	<b>Drying Procedure</b>
Apples (mature, firm)	Wash. Pare, if desired, and core. Cut in rings or slices 1/8 to 1/4" thick or cut in quarters	Choose one: *Soak 5 minutes in sodium sulfite	Arrange in single layer on trays, pit side up. Dry until soft, pliable and

	or eighths. Coat with ascorbic acid solution to prevent darkening during preparation (uses 2 1/2 tsp/cup water).	solution. *Steam-blanch 3 to 5 minutes, depending on size and texture. *Sulfur 45 to 60 minutes.	leathery, no moist area in center when cut.
Apricots (firm, fully ripe)	Wash. Cut in half and remove pit (do not peel). Coat with ascorbic acid solution to prevent darkening during preparation (1 tsp/cup).	Choose one: *Soak 5 minutes in sodium sulfite solution. *Steam blanch 3 to 5 minutes. *Sulfur 1 to 2 hours.	Arrange in single layer on trays, pit side up; pop the cavity up to expose more flesh to air. Dry until soft, pliable and leathery; no moist area in center when cut.
Bananas (firm, ripe)	Peel. Cut in 1/8" slices.	No treatment necessary; may choose: *Dip in lemon juice. *Sulfur 15 to 30 minutes.	Arrange in single layer on trays. Dry until tough and leathery.
Berries (firm)	Wash. Leave whole or cut in half.	No treatment necessary; may choose: *Dip in boiling water 15 to 30 seconds to crack skins. *Steam blanch 30 seconds to 1 minute.	Spread in layer not more than two berries deep. Dry until hard and berries rattle when shaken on trays.
Cherries (fully ripe)	Wash. Remove stems and pits.	No treatment necessary; may choose: *Dip whole cherries in boiling water 15 to 30 seconds to crack skins.	Arrange in single layer on trays. Dry until tough, leathery and slightly sticky.
Citrus peel (thick-skinned with no signs of mold or decay and no color added)	Wash. Thinly peel outer 1/16 to 1/8" of the peel; avoid white bitter part.	No pretreatment necessary.	Arrange in single layers on trays. Dry at 130 degrees F for 1 to 2 hours; then at 120 degrees F until crisp.
Figs (fully ripe)	Wash or clean with damp towel. Peel dark skinned varieties if desired. Leave	No treatment necessary; may choose:	Arrange in single layer on trays. Dry until leathery and pliable.

	whole if small or partly dried on tree; cut large figs in halves or slices.	*Crack skins of whole figs in boiling water 15 to 30 seconds.	
Grapes and black currants (seedless varieties)	Wash, sort, leave whole on stems in small bunches, if desired. May also remove stems.	No treatment necessary; may choose: *Crack skins in boiling water 15 to 30 seconds. *Steam blanch 1 minute.	Spread in thin layer on trays. Dry until pliable and leathery with no moist center.
Melons (mature, firm and heavy for size; cantaloupe dries better than watermelon)	Wash. Remove outer skin, any fibrous tissue and seeds. Slice 1/4 to 1/2" thick.	No treatment necessary.	Arrange in single layer on trays. Dry until leathery and pliable with no pockets of moisture.
Nectarines and Peaches (ripe, firm)	Peel. Cut in half and remove pit. Cut in quarters or slices if desired. Coat with ascorbic acid solution to prevent darkening during preparation (1 tsp/cup).	Choose one: *Soak 5 to 15 minutes in sodium sulfite *Steam blanch halves 8 to 10 minutes, slices 2 to 3 minutes. *Sulfur 2 to 3 hours.	Arrange in single layer on trays pit side up. Turn halves over when visible juice disappears. Dry until leathery and somewhat pliable.
Pears (Bartlett variety is recommended)	Wash. Pare, if desired. Cut in half lengthwise and core. Cut in quarters or eighths or slice 1/8 to 1/4" thick. Coat with ascorbic acid solution to prevent darkening during preparation (1 tsp/cup).	Choose one: *Soak 5 to 15 minutes in sodium sulfite *Steam blanch 5 to 7 minutes *Sulfur 1 to 5 hours, depending on thickness	Arrange in single layer on trays pit side up. Dry until springy and suede-like with no pockets of moisture.
Plums and prunes	Wash. Leave whole if small; cut large fruit into halves (pit removed) or slices.	No treatment necessary; may choose: *Steam blanch halves or slices 5 to 7 minutes *Crack skins in boiling water 1 to 2 minutes *Sulfur 1 hour	Arrange in single layer on trays pit side up, cavity popped out. Dry until pliable and leathery; pit should not slip when squeezed if prune not cut.

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Go to [top of this page](#).

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